CLAIMS

What is claimed is:

1. A metropolitan area packet ring, comprising:

a fiber optic loop carrying asynchronous data packets, wherein the asynchronous data packets flow in one direction through the fiber optic loop;

a plurality of metropolitan packet switches coupled to the fiber optic loop, wherein a metropolitan packet switch is comprised of:

an I/O port coupled to the fiber optic loop which inserts packets of data onto the fiber optic loop and which pulls packets of data off the fiber optic loop;

a processor coupled to the I/O port which separately regulates data packets transmitted over the fiber optic loop, wherein quality of service is guaranteed.

2. The metropolitan area packet ring of Claim 1, wherein bandwidth is allocated on a per-flow basis.

3. The metropolitan area packet ring of Claim 1, wherein the processor decreases a data rate of a flow upstream to a point of congestion in order to guarantee quality of service.

4. The metropolitan area packet ring of Claim 1, wherein bandwidth that becomes available is allocated amongst a plurality of flows.

5. The metropolitan area packet ring of Claim 4, wherein the metropolitan packet switch allocates available bandwidth according to a pre-determined weighting scheme.

6. The metropolitan area packet ring of Claim 1 further comprising a ring management system coupled to one of the metropolitan packet switches which sets up the metropolitan packet switches in order to guarantee pre-determined quality of service on a per-flow basis.

7. The metropolitan area packet ring of Claim 1, wherein the quality of service includes a variable bit rate with a minimum bandwidth.

8. The metropolitan area packet ring of Claim 1, wherein the quality of service includes a constant bit rate with a minimum delay.

9. The metropolitan area packet ring of Claim 1, wherein the metropolitan packet switch performs rate shaping.

10. The metropolitan area packet ring of Claim 1, wherein the data packets transmitted through the fiber loop comprise 10 gigabit Ethernet.

11. In a metropolitan area packet ring having a plurality of switching devices through which a plurality of devices are coupled to the metropolitan area packet ring, a method for managing packetized traffic

flowing asynchronously through the metropolitan area packet ring to guarantee a particular quality of service for a subscriber, comprising the steps of:

assigning the particular quality of service to the subscriber;

controlling asynchronous data packets being transmitted over the metropolitan area packet ring, wherein the subscriber is always guaranteed to have the minimum bandwidth regardless of the congestion on the metropolitan area packet ring.

12. The method of Claim 11 further comprising the step of controlling the asynchronous data packets on a per-flow basis.

13. The method of Claim 11 further including the steps of:

determining packetized data congestion corresponding to particular segments of the metropolitan area packet ring;

adjusting a data rate upstream to a point of congestion in order to guarantee that the minimum bandwidth assigned to the subscriber is being met.

14. The method of Claim 11 further comprising the step of allocating bandwidth that becomes available to subscribers according to a pre-determined weighting scheme.

15. The method of Claim 11, wherein the packetized data flowing through the fiber optic loop is comprised of Ethernet packets.

16. The method of Claim 15, wherein the fiber optic loop is comprised of 10 Gbit Ethernet.

17. The method of Claim 11, wherein the quality of service corresponds to either a variable bit rate with a minimum bandwidth or a constant bit rate with a minimum delay.

18. A device for routing packetized data in a packet ring, comprising:

a first port used to insert data packets onto the packet ring;

a second port used to take data packets off from the packet ring;

a processor coupled to the first port which regulates data packets flowing asynchronously through the packet ring, wherein bandwidth which becomes available is re-allocated.

19. The device of Claim 18, wherein data rates are controlled on a per-flow basis.

20. The device of Claim 18, wherein the processor adjusts the data rates such that quality of service is guaranteed.

21. The device of Claim 18, wherein the processor controls a rate by which data packets belonging to upstream flows are allowed to be inserted onto the packet ring.

22. The device of Claim 18 further comprising a circuit which allocates available bandwidth on a per-flow basis.

23. The device of Claim 18, wherein the data rates of upstream flows are increased according to a pre-determined weighting scheme.

24. The device of Claim 18, wherein the packet ring is comprised of a fiber loop.

25. In a packet ring having a plurality of switching devices coupled to the packet ring, a method to manage packetized traffic flowing asynchronously through the packet ring, comprising the steps of:

assigning initial bandwidths corresponding to a plurality of subscribers;

determining packetized data congestion in the metropolitan area packet ring, wherein if bandwidth becomes available, the available bandwidth is allocated to be used by the subscribers.

TP 26 ~~25.~~ The method of Claim 25, further comprising the step of allocating bandwidth on a per-flow basis.

TP 27 ~~26.~~ The method of Claim 25 further comprising the step of allocating the available bandwidth to flows according to a pre-determined weighting scheme.

TP 28 27. The method of Claim 25 further comprising the step of controlling rates by which packetized data is allowed to be inserted onto the packet ring in order to provide quality of service for a set of the subscribers.

TP 29 28. The method of Claim 27 further comprising the step of reducing a data rate of an upstream flow to guarantee that the quality of service is maintained for a subscriber.

TP 30 29. The method of Claim 25, wherein the packet ring comprises a fiber optic loop and the packetized data is comprised of Ethernet packets.